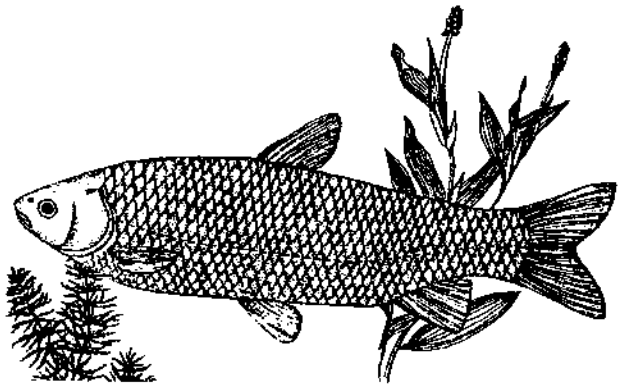
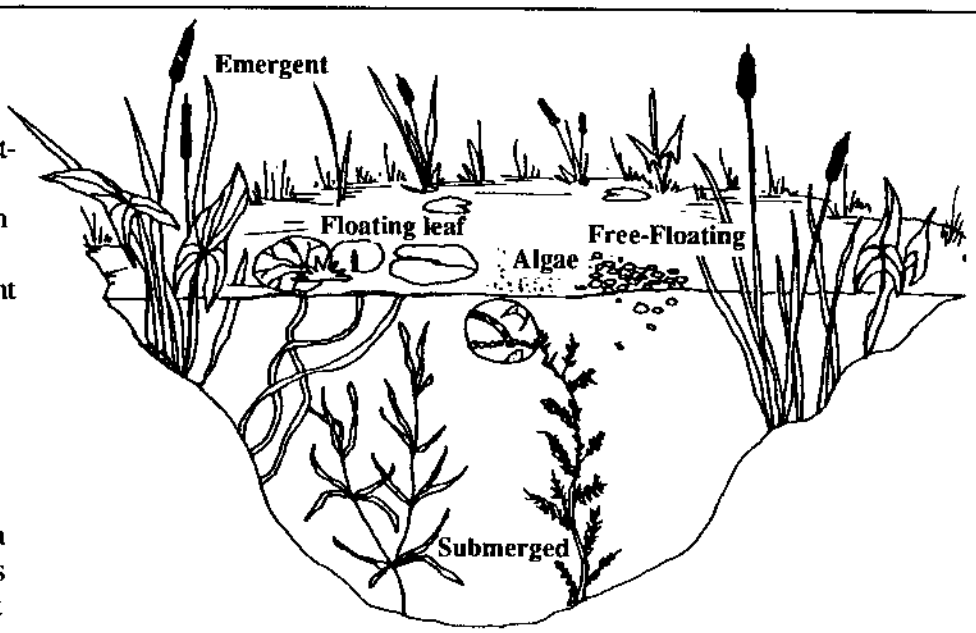
Washington Department of Wildlife

Serving Washington's wildlife and people— now and in the future



HOW MANY GRASS CARP NEED TO BE PLANTED?



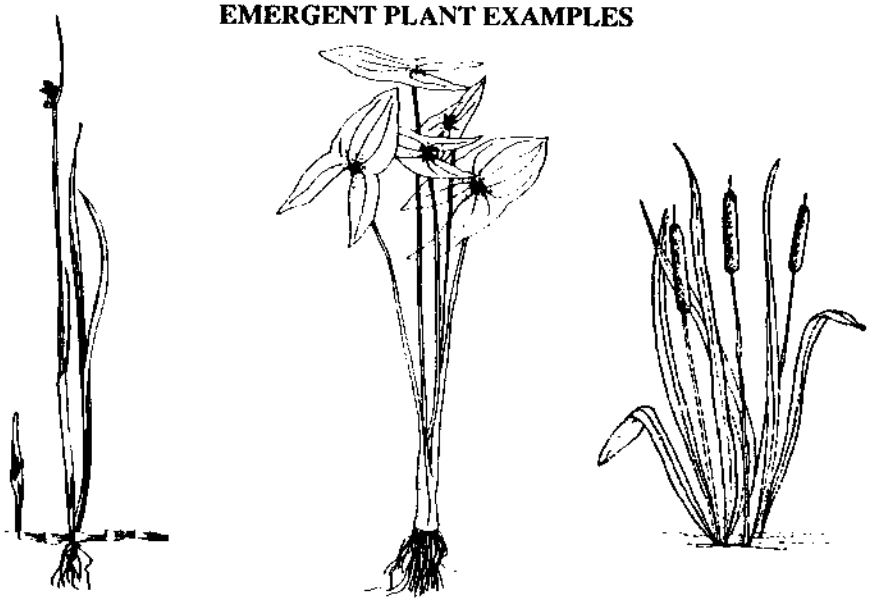
In order for the Washington Department of Wildlife to determine how many triploid grass carp are needed in your lake or pond, you must provide us with a rough estimate of the amount of each type of aquatic plant that is present. The following drawings should provide you with all you need to know when mapping vegetation types in your water.

There are basically five types of plants to consider when determining a grass carp stocking rate. These groups are displayed in the drawings and text that follows.

EMERGENT PLANTS:

Typical emergent plants include cattails, bulrushes and arrowheads. Generally they are rooted in the lake bottom along the shores and grow through the water up into the air. ***Grass carp generally will not eat emergent plants.***

EMERGENT PLANT EXAMPLES



Bulrush
(up to six feet tall)

Arrowhead
(up to two feet tall

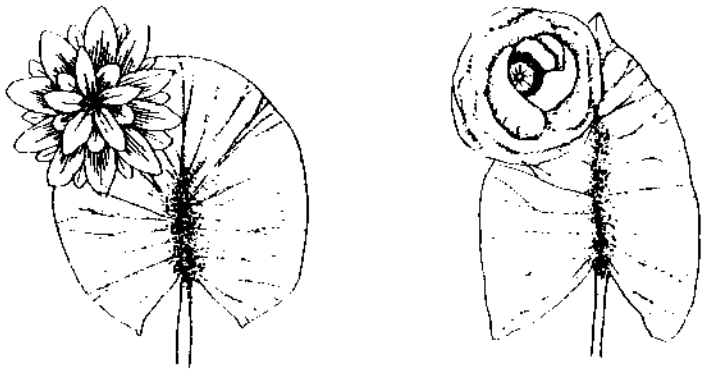
Cattail
(up to six feet tall)

HOW MANY GRASS CARP NEED TO BE PLANTED?

FLOATING LEAF PLANT EXAMPLES

FLOATING LEAF PLANTS:

Typical floating leaf plants are water lilies (lily pads). The large leaves float on the surface connected by long stems to roots in the lake bottom. ***Grass carp generally will not eat floating leaf plants.***

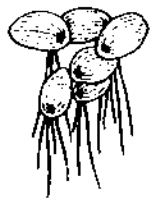


Water Lilies (2-10 inches across)

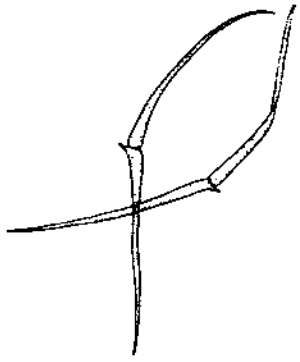
FREE-FLOATING PLANT EXAMPLES

FREE-FLOATING PLANTS:

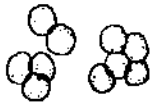
Duckweeds are typical free-floating plants. They are tiny plants which float freely on the surface of the water and are not rooted to the bottom. ***Although not highly preferred, grass carp will eat free-floating plants.***



Spirodela polyrhiza
(about 1/8 inch across)



Wolffiella floridana
(about 1/2 inch long)

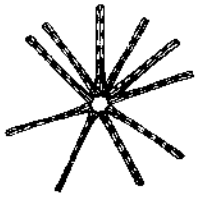


Wolffia columbiana
(about 1/100 inch across)

MICROSCOPIC VIEWS OF SOME ALGAE

ALGAE:

There are two types of algae. The single-celled microscopic variety which can turn a lake the color of pea soup and the filamentous kind which forms large floating mats. No leaves or stems exist and the mats are slimy and shapeless. ***Grass carp do not eat the single-celled form, but will reluctantly eat filamentous algae.***



Asterionella formosa

Melosira granulata

Ceratium hirundinella

Synura uvella

Anabaena flos aquae

Tabellaria fenestrata

HOW MANY GRASS CARP NEED TO BE PLANTED?

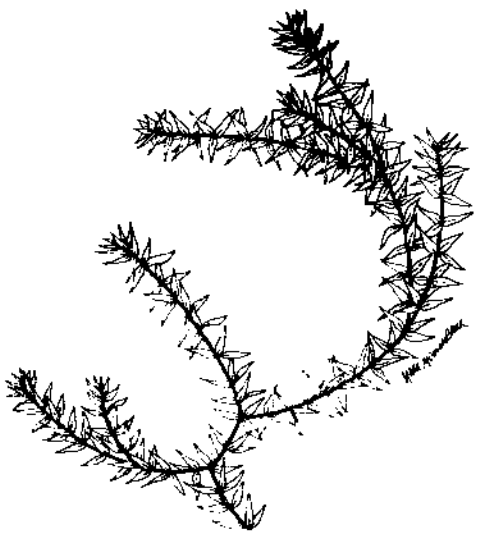
SUBMERGENT PLANTS:

Typical submergent plants are pondweeds, coontails and milfoils. They are rooted to the bottom and in most cases are completely submerged. Some plants in this group float at the surface in large mats, but they look nothing like the floating plant groups such as lily pads and duckweed. This group of plants represents the most readily consumed by grass carp, although some submergents are preferred over others.

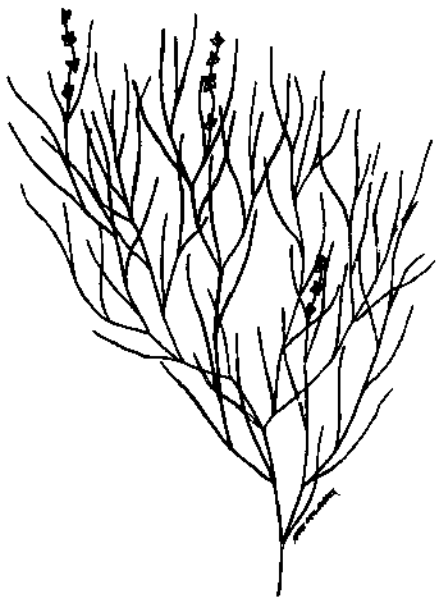
Preferred submergent plants include:

1. Canadian waterweed (elodea)
2. thin-leaved pondweeds
3. water celery (vallisneria)
4. curl-leaved pondweed

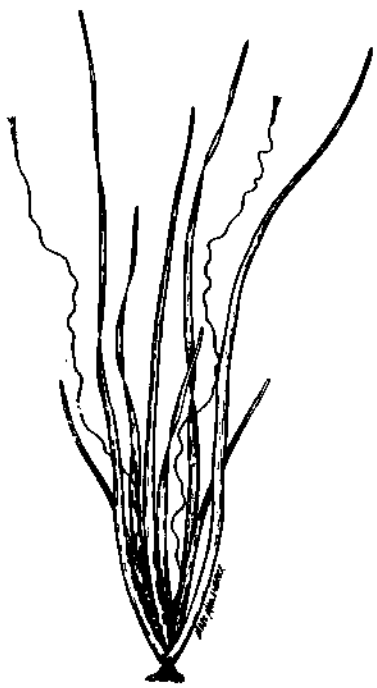
PREFERRED SUBMERGENT PLANT EXAMPLES



Elodea
(up to 6 feet long)



Thin-leaved Pondweed
(up to 6 feet tall)



Water Celery
(up to 2 feet tall)

Curly-leaved Pondweed
(up to 6 feet)

HOW MANY GRASS CARP NEED TO BE PLANTED?

(Submergent Plants continued)

Less preferred submergent plants include: broad leaf pondweeds, milfoils and coontails.

LESS PREFERRED SUBMERGENT PLANT EXAMPLES

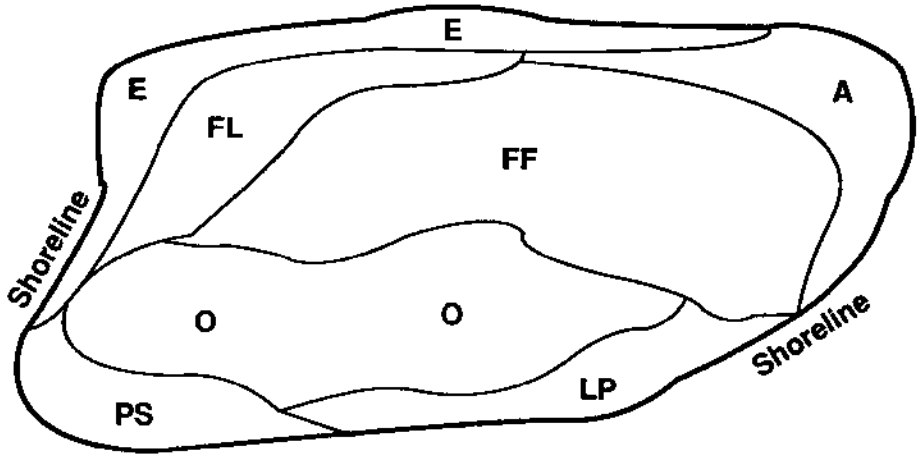
Broad Leaf Pondweed
(up to 6 feet tall-leaves may float)

Milfoil
(up to 10 feet tall)

Coontail
(up to 6 feet long)

MAP DRAWING INSTRUCTIONS

Please use the blank sheet of paper attached to your *Application for Stocking Triploid Grass Carp* to draw a map of your water as close to scale as possible. Also draw in the approximate areas that are covered by each type of plant and properly label each. **Plant coverage estimates should be made in July or August or from your best recollection of that time period.**



E -Emergent Plants
FL - Floating Leaf Plants
FF - Free Floating Plants
A - Algae
PS - Preferred submergent
LP - Less preferred
O - Open water

NOTE: all plant types may not be present

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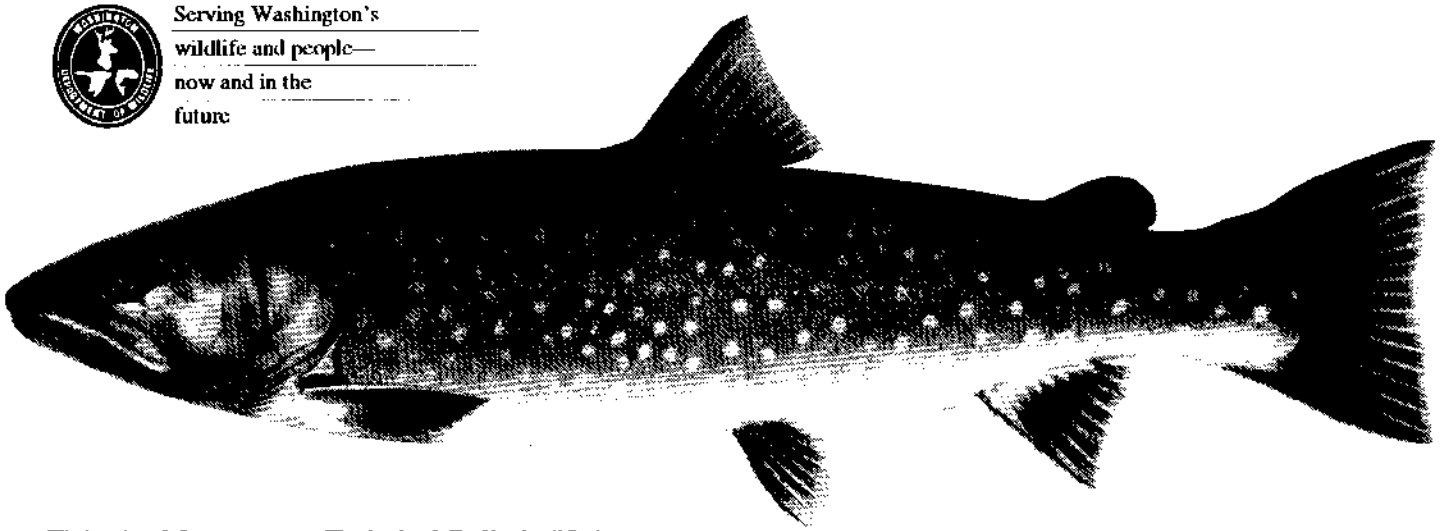

Fisheries Management Technical Bulletin 92-1

Washington's Native Chars

In the cold, clear waters of the Pacific Northwest a number of the world's most important and beautiful fish–the trout, salmon and char–have evolved. But none of these natives (collectively known as salmonids) are as pretty or as mysterious as our native char–the Dolly Varden and bull trout.

Found in lakes and rivers, as well as small headwater streams, sometimes migrating back and forth between fresh and salt water, and sometimes not, these fish have puzzled fisheries biologists and ichthyologists (people who specialize in the study of fish) since they were first discovered. About the only thing everyone agreed on was that they were members of the char family. And they are the only char native to Washington.

Early studies described these fish as a variety of the Arctic char, while later work declared them to be a separate species. For a long time, biologists felt that the bull trout was just a localized version of the Dolly Varden. Now many fisheries scientists believe that the Dolly Varden trout and bull trout are two distinct species that look amazingly similar.

As more of the puzzle surrounding these species unravels, it is becoming clearer to managers that these fish are reeling from a head-on collision with rampant human population growth and environmental damage, and are losing.

Historically, sport fishing regulations were liberal for bull trout and Dolly Varden. But in more recent times, as indications of fish abundance began to decline, more restrictive regulations were imposed on some waters. Now, due to the continued decline of these species, beginning in 1992 regulations will be much more restrictive. **Sport harvest of Dolly Varden and bull trout in eastern and southwestern Washington is closed. Coastal and Puget Sound area fishermen will be restricted to a daily catch limit of two fish over 20 inches in length.** *(For specific regulations, consult the Washington Department of Wildlife Game Fish Regulations Pamphlet.)*

DESCRIPTION

Bull trout and Dolly Varden can grow quite large, with typical adults reaching two to five pounds in Washington. The state record bull trout caught from the Tieton River weighed 22 pounds, 8 ounces, while the record Dolly Varden, taken from the Skykomish River weighed 10 pounds.

Although closely resembling trout in body shape, char–which includes the imported brook trout and lake trout–can be distinguished from their relatives by their very fine scales and a reverse coloration. Char have dark-colored bodies with light spots while trout (rainbow and cutthroat) have light-colored bodies with dark spots.

Bull trout and Dolly Varden are difficult to distinguish from each other, even for specialists. Dolly Varden tend to have a more rounded body shape while bull trout have a larger, more flattened head and a more pronounced hook on the lower jaw (known as a kype.) Some scientists believe that one of the distinguishing characteristics of bull